

is less severe than these, but which is something more than a mere description of acoustic phenomena, is still a desideratum. Where attempts have been made to supply the want the result is not successful, owing chiefly to the clumsy methods employed in "getting round" the calculus. We are not upholders of the doctrine that the calculus should be "got round"; it is much better, we think, to "get through" it. Experience in teaching others has taught us that pupils find no difficulty in grasping its elements, and this is the case whether they are taught analytically or geometrically. Why then should we seek to devise elaborate methods of eluding the calculus—methods which in most cases we would never think of employing ourselves, and which, moreover, are usually only adapted to the particular problem for which they are devised—when a straightforward introduction to the methods we use ourselves would clear the ground and render the student's progress easy, and enable him the sooner to be his own path-finder instead of needing to rely on the guidance of others?

The book under review cannot supply this want in England, for it is a translation into German (from the Dutch); the substance of the book is in the above respect, however, entirely to our mind.

No calculus is employed in name; but the notion of it is everywhere. Velocity is the limiting value of a ratio and so is acceleration, and their values are found by the usual direct methods employed in proving the initial theorems of the calculus. We would have gone a step further and given the process a name, in order to suggest to the student to what branch of mathematics these and similar theorems belong. But the notion is the main thing. There is nothing here which a man will discard at a future time, having learnt a better way; though he will, of course, learn to abbreviate the logical statements of the process into the mere symbols dx/dt and d^2x/dt^2 .

Without making a full analysis, the following subjects dealt with may be briefly stated:—In the mathematical treatment: simple harmonic motion—waves and their composition, with a proof of all the simple theorems.

Fourier's theorem is given, but not proved; it is illustrated, however. The dynamical equation to simple harmonic motion is given, and the motion deduced by showing that it satisfies the equation. Even the case of a restoring force involving second as well as first power of displacement is given, on account of its importance in connection with the Helmholtz theory of the production of combination tones. The equation to damped motion is treated as an article for faith; its properties, however, are lucidly described.

Although the experimental phenomena are mainly collected together, the mathematical portion is not wholly free from experimental illustration. For example, we specially note a device which should be found useful for illustrating the behaviour of forced oscillations with different degrees of damping.

Perhaps the most interesting section is that dealing with the interference and diffraction of waves. This might be amplified by an account of recent experiments imitative of Lloyd's mirror and diffraction from two apertures (Young's experiment); and, in particular, an account of Rayleigh's brilliant application of the principles of diffraction in *restricting* the spreading of sound to one

plane by suitably shaping the aperture of the fog horns employed in coast signals would form an excellent additional illustration.

The last chapter is concerned with movements of air in pipes, concluding with an account of the secondary motions usually developed, such as the small striations in the cork figures in a Kundt's tube, which were investigated by Walther König and others (König is mentioned without being discriminated from R. König). These are highly interesting, though many will no doubt consider them rather out of place in an elementary book.

There is no mention of Rücker's important experiments in connection with combination tones.

OUR BOOK SHELF.

Malarial Fever, its Cause, Prevention and Treatment.

Containing full Details for the use of Travellers, Sportsmen, Soldiers, and Residents in Malarious Places. By Ronald Ross, F.R.S., Walter Myers Lecturer in the Liverpool School of Tropical Medicine. Ninth edition, revised and enlarged. Pp. 68. (London: Published for the University Press of Liverpool by Longmans, Green and Co., 1902.) Price 2s. 6d.

THIS little book is an enlargement of a previous work by the same author, and should prove of the utmost use to those for whom it is written. The exact knowledge concerning the epidemiology of malaria which has been attained during the last six or seven years has made clear the principles upon which the disease may be prevented in the individual and perhaps exterminated in the locality. The wide dissemination of these principles and of the facts upon which they are based is the next obvious step in the campaign against malaria, and the Liverpool School of Tropical Medicine has done good service in the publication of this work. Within the short compass of some seventy pages we find a lucid and succinct account of the nature and life-history of the malarial parasite, of the habits and life-histories of the gnats which serve as its definitive hosts, of the precautions to be taken to avoid infection, and of the elementary treatment of the disease should it be acquired. In short, nothing is wanting that should enable an intelligent man, even if devoid of any scientific training, to escape malaria, even where it is most virulently endemic. The writer's wide experience, and the important share which he has taken in building up our knowledge of the disease and its propagation, are a sufficient guarantee of the accuracy of his information and of the practical value of his rules for guidance. There is a consensus of practical experience that, by attention to the rules here set forth, a man may safely pass through countries where malaria of the most dangerous type prevails. We recommend the book heartily to all who have occasion to sojourn in such lands.

Velocity Diagrams. Their Construction and Uses.

Intended for all who are interested in Mechanical Movements. By Prof. C. W. MacCord, A.M., Sc.D. Pp. iii + 116; 83 figures. (New York: John Wiley and Sons; London: Chapman and Hall, Ltd., 1902.) Price 1.50 dollars.

IN this book some examples of plane motions of machines are worked out. The title well describes the scope and contents of the work and the very modest aims of the author.

The main problem to which the discussion is directed is:—Given a skeleton drawing of a mechanism and the speed of the driving point, to find graphically the corresponding speed of the driven point, and to show the latter all throughout the cycle by means of a rectangular

curve of speed plotted on a time base. The author believes that this curve exhibits the kinematic action of the machine more clearly and directly than any other form of diagram.

Beginning with the composition and resolution of velocities, it is shown how the constraints of slides, pivots and rigidly connected points affect the ordinary rules for vectors, and one or two simple special rules are established. These are applied systematically to selected mechanisms such as pruning shears, quick return motions, direct-acting and oscillating cylinder engines, epicyclic trains of wheels, the pilgrim-step motion, &c., until the reader becomes quite familiar with the process.

No attempt is made to give more than a cursory and very limited account of the plane motions of mechanisms, consequently many important theorems and constructions of a general nature find no place. Simple harmonic motions, and harmonic analysis, often so useful, are not considered. Acceleration is only incidentally referred to in showing how an acceleration-time curve can be determined graphically from a velocity-time curve. The author has evidently imposed severe restrictions as to the amount of ground to be covered. But so far as the subject is dealt with, the methods and demonstrations are very clear and convincing, and the diagrams are well drawn and beautifully printed.

Spiderland. By Rose Haig Thomas. Pp. viii + 227. (London: Grant Richards, 1902.) Price 5s.

THIS is a charming little book, based on the authoress's original observations on a variety of animals and plants, and cast into a poetic form likely to interest children in natural history. It is dedicated as follows:—"To my Son, whose wondering child-eyes first taught me to look deeper into the workings of Nature, and to all the Children I know and shall never know, I dedicate these simple tales." As we remarked when reviewing elsewhere the first edition, printed for the author in 1898, which comprised only the first twelve tales, whereas twelve more are added in the present edition, the book reminds us of the "Episodes of Insect Life," on the one hand, and Mrs. Gatty's "Parables from Nature" on the other. The mode of treatment resembles that of the former book, and the general style the latter. A great variety of subjects are dealt with, and only one or two of the stories relate to spiders; among others, we note such titles as "The Tree Frogs," "Pistil the Peace-maker" (a more elegant setting of the old fable of the "Stomach and the Limbs"); "Thomisa Citrina, the Robber-Mother"; "The Wedding of the Fly Ophrys"; "The Green Caterpillar" (a study somewhat resembling one of Mrs. Gatty's, but dealing with a more mournful phase of caterpillar life, an ichneumonid caterpillar); "Hymen, the Worker Ant"; "Nimble Nat, the Gay Grasshopper"; "Cocky: a London Love-Tale" (sparrows); "The Romance of the Water Beetle"; "The Lemming," &c. The remarks on the lemming are interesting, and will be new to many readers. Here and there we meet with a trifling oversight; the authoress has travelled in France and Norway, and has forgotten to note that processional caterpillars are not British; and the auditory organs (hardly "ears") of grasshoppers are situated, not in the hind legs, but in the front legs.

Children are easily interested in natural history and insect life; and a poetical view of some of its phases, such as Mrs. Thomas has here given, is likely to prove more attractive to them than a purely didactic book, like "Uncle Philip's Conversations with Children," which was almost the first book on natural history read to the present writer in his childhood. Naturally, the stories written by Mrs. Thomas are not all of equal merit; but most of them are excellent, and we regret that our space will not allow us to give a sufficiently long quotation to afford a fair idea of the style of her book. W. F. K.

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Tuberculosis as a Disease of the Masses, and How to Combat It. By S. A. Knopf, M.D., of New York. Adapted for English use by J. M. Barbour, M.D. Pp. 76; 25 figures. (London: Rebman, Ltd., 1902.) Price 1s. net.

IN plain, simple language, devoid of technicalities, Dr. Knopf presents an accurate account of the causes of tuberculosis, some details of the symptoms of a few of its many phases, and indicates the chief hygienic principles which underlie the present-day methods of treatment.

He emphasises the fact that tuberculosis is a contagious and therefore a preventable disease, that the child of a tuberculous mother is not itself necessarily tuberculous, although it frequently acquires the disease—the maternal kisses often being the channel of infection—that man may derive the infection from animals and that he may in turn transmit the disease to them, and above all that *tuberculosis is a curable disease*.

The author fully explains the duty of the consumptive to himself and to his fellows, and points out in no uncertain manner the real danger attendant upon the habit of spitting elsewhere than in a proper receptacle by the subjects of this disease. He also gives much excellent and useful advice with regard to the practice of calisthenics by, and the inculcation of habits of cleanliness in, the young, and the value of fresh air and sunshine as factors in the prevention and cure of tuberculosis, as well as many suggestive hints on the home care of consumptives.

We are not surprised to learn that this essay was awarded the first prize (200*l.*) offered by the "International Congress for the Study of the Best Way to Combat Tuberculosis as a Disease of the Masses," which met at Berlin, and that it has already been published in five languages besides English. It is an excellent treatise, and should be in the hands of every individual, sick or well, who has at heart the physical welfare of his fellow mortals.

The Teacher's Manual of Object Lessons in Geography. By Vincent T. Murché. Pp. xvi + 334. (London: Macmillan and Co., Ltd.) Price 3s. 6*d.*

How great has been the improvement in methods of teaching during recent years can be measured to some extent by a comparison of newly published books intended for use in public elementary schools with those in circulation twenty years ago. The old implicit reliance on the child's faculty for memorising is fortunately giving place to an appeal to his observation and incipient reasoning powers. Mr. Murché's latest addition to his already extensive series of books on elementary science is marked by his usual clearness of exposition and by that helpfulness for which he is justly highly esteemed by teachers in elementary schools. But the bewildering miscellany of type, with its frequent transitions from Roman to italics and from these to Clarendon and capitals, makes the volume a trying one to read and raises the question of the possibility of such over-emphasis defeating the object in view. It is unfortunate that in explaining volcanic activity the author speaks of "dense volumes of flame and smoke" which "burst out from the crater," and that he instructs the teacher to explain "that ages ago this earth on which we live was a burning mass like the sun." This seems to indicate a want of clearness as to the nature of smoke and burning; it will certainly give the child a wrong idea. But the book should do a great deal to improve the teaching of geography.

William Gilbert of Colchester: a Sketch of his Magnetic Philosophy. By Charles E. Benham. Pp. 96. (Colchester: Benham and Co., 1902.) Price 2s. net.

THE immediate occasion of the appearance of this little book is the issue to the subscribers of the Gilbert Club of the English translation of "De Magnete." The author